

Amendments to the Claims:

This listing of the claims will replace all prior versions and listing of claims in the application:

Claim 1(original): A microfluidic device, comprising:

- (a) at least one channel for conducting a fluid, said channel having an internal channel surface formed in a substrate;
- (b) a first polymer attached to the channel surface through photoinitiated grafting of a first monomer to selected regions of the channel surface; and
- (c) a porous polymer monolith, comprised of a second monomer, in said channel, and attached to said first polymer in the selected regions, wherein the first and second monomers may be the same or different.

Claim 2(original): The device of claim 1 wherein said substrate is thermoplastic and transparent to light in the wavelength range of 200 to 350 nm.

Claim 3(currently amended): The device of claim [[4]]2 wherein the thermoplastic substrate is selected from the group consisting of poly(methyl methacrylate), poly(butyl methacrylate), poly(dimethylsiloxane), polyolefin, cyclic olefin copolymer, polyethylene, polypropylene, poly(ethylene terephthalate), poly(butylene terephthalate), polyimide and hydrogenated polystyrene.

Claim 4(original): The device of claim 1 wherein said thermoplastic substrate is a polyolefin.

Claim 5(original): The device of claim 4 wherein the thermoplastic substrate polyolefin is cyclic olefin copolymer.

Claim 6(original): The device of claim 1 wherein the substrate is selected from the group consisting of PS-H, COC and PP.

Claim 7(original): The device of claim 1 wherein the channel is 10-200 µm deep.

Claim 8(original): The device of claim 1 wherein the first polymer attached to the channel surface for grafting is comprised of one or more monomers selected from the group consisting of a polyvinyl monomer, a monovinyl monomer, and a mixture of a polyvinyl and monovinyl monomer.

Claim 9(currently amended): The device of claim 8 wherein said one or more monomer is a monovinyl monomer which is selected from the group consisting of acrylic acids, methacrylic acids, acrylamides, methacrylamide alkyl derivatives of methacrylamide, alkyl derivatives of acrylamide, alkyl acrylates, alkyl methacrylates, perfluorinated alkyl acrylates, perfluorinated alkyl methacrylates, hydroxyalkyl acrylates and hydroxyalkyl methacrylates, wherein the alkyl group in each of the aforementioned alkyl monomers has 1-10 carbon atoms, oligoethyleneoxide acrylates, oligoethyleneoxide methacrylates, vinylazlactones, and acrylate and methacrylate derivatives including primary, secondary, tertiary, and quarternary amine functionalities and zwitterionic functionalities.

Claim 10(currently amended): The device of claim 8 wherein said one or more monomer is a polyvinyl monomer which is ~~one or more monomers~~ selected from the group consisting of alkylene diacrylates, alkyl dimethacrylates alkylene diacrylamides, alkylene dimethacrylamides, hydroxyalkylene diacrylates, hydroxyalkylene dimethacrylates, wherein the alkylene group in each of the aforementioned alkylene monomers consists of 1-6 carbon atoms, oligoethylene glycol diacrylates, oligoethylene glycol dimethacrylates, vinyl esters of polycarboxylic acids, divinyl ethers, pentaerythritol di-, tri-, or tetramethacrylates, pentaerythritol di-, tri-, or tetraacrylates, trimethylolpropane trimethacrylates, trimethylolpropane acrylates, alkylene bis acrylamides and alkylene methacrylamides.

Claim 11(original): The device of claim 1 wherein the first polymer attached to the channel surface for grafting is comprised of at least one monomer selected from the group consisting of AAm, BuA, AMPS, EDA, EDMA, MMA and MA.

Claim 12(currently amended): The device of claim 1 wherein the porous polymer monolith is comprised of one or more polymerized monomers selected from the group consisting of polyvinyl monomers or a mixture of polyvinyl and monovinyl monomers.

Claim 13(currently amended): The device of claim 12 wherein the said one or more monomer for the monolith is a polyvinyl monomers for the monolith comprise one or more monomers which is selected from the group consisting of alkylene diacrylates, alkylene dimethacrylates, hydroxyalkylene diacrylates, hydroxyalkylene dimethacrylates, alkylene bisacrylamides, alkylene bismethacrylamides, wherein the alkylene group each of the aforementioned alkylene monomers has 1-6 carbon atoms, oligoethylene glycol diacrylates, oligoethylene dimethacrylates, diallyl esters of polycarboxylic acids, divinyl ethers, pentaerythritol di-, tri-, or tetraacrylates, pentaerythritol di-, tri-, or tetra methacrylates, trimethylopropane triacrylates and trimethylopropane trimethacrylates.

Claim 14(currently amended): The device of claim 12 wherein the said one or more monomer for the monolith is a monovinyl monomers for the monolith comprise a monomer which is selected from the group consisting of acrylic acids, methacrylic acids, acrylamides, methacrylamide alkyl derivatives of methacrylamide, alkyl derivatives of acrylamide, alkyl acrylates, alkyl methacrylates, perfluorinated alkyl acrylates, perfluorinated alkyl methacrylates, hydroxyalkyl acrylates and hydroxyalkyl methacrylates, wherein the alkyl group in each of the aforementioned alkyl monomers has 1-10 carbon atoms, oligoethyleneoxide acrylates, oligoethyleneoxide methacrylates, vinylazlactones, and acrylate and methacrylate derivatives including primary, secondary, tertiary, and quarternary amine functionalities and zwitterionic functionalities.

Claim 15(original): The device of claim 2 wherein the porous polymer monolith is comprised of a mixture of monomers selected from the group consisting of HEMA, EDMA and BuMA.

Claim 16(currently amended): The device of claim 1 further comprising:

(d) a polymer chain comprising a third monomer having a functional group, wherein said polymer chain is attached to a portion of the porous polymer monolith by photoinitiated grafting of said third monomer, wherein the first and second monomers may be the same or different and the third monomer is different from the second monomer.

Claim 17(original): The device of claim 16 wherein the third monomer bearing the functional group is selected from the group consisting of: acrylic acids, methacrylic acids, acrylamides, methacrylamides, alkyl acrylamides, alkyl methacrylamides, alkyl acrylates, alkyl methacrylates, perfluorinated alkyl acrylates, perfluorinated alkyl methacrylates, hydroxyalkyl acrylates, hydroxyalkyl methacrylates, wherein the alkyl group each of the aforementioned alkyl monomers has 1-10 carbon atoms, vinylazlactones, oligoethyleneoxide acrylates, oligoethyleneoxide methacrylates, and acrylate and methacrylate derivatives wherein the derivatives comprise a primary, secondary, tertiary or quarternary amine or a zwitterion.

Claim 18(original): The device of claim 16 wherein the third monomer bearing the functional group is selected from the group consisting of: methyl acrylate, methyl methacrylate, butyl acrylate, butyl methacrylate, *tert*-butyl acrylate, *tert*-butyl methacrylate, 2-hydroxyethyl acrylate, 2-hydroxyethyl methacrylate, acrylic acid, methacrylic acid, glycidyl acrylate, glycidyl methacrylate, 3-sulfopropyl acrylate, 3-sulfopropyl methacrylate, pentafluorophenyl acrylate, pentafluorophenyl methacrylate, 2,2,3,3,4,4,4-heptafluorobutyl acrylate, 2,2,3,3,4,4,4-heptafluorobutyl methacrylate, 1H,1H-perfluoroctyl acrylate, 1H,1H-perfluoroctyl methacrylate, acrylamide, methacrylamide, N-ethylacrylamide, N-isopropylacrylamide, N-[3-(dimethylamino)propyl] methacrylamide, 2-acrylamido-2-methyl-1-propanesulfonic acid, 2-acrylamidoglycolic acid, [2-(methacryloyloxy)ethyl]-trimethylammonium chloride, [2-(methacryloyloxy)ethyl]dimethyl(3-sulfopropyl)ammonium hydroxide, and 2-vinyl-4,4-dimethyl-azlactone.

Claim 19(original): The device of claim 16 wherein the third monomer is selected from the group consisting of AMPS, BuA and VAL.

Claim 20(original): A microfluidic device, comprising:

- (a) at least one channel for conducting a fluid, said channel having an internal channel surface formed in a substrate comprising a polyolefin;
- (b) a first polymer, comprised of a first polyvinyl monomer, attached to the channel surface through photoinitiated grafting of to selected regions of the channel surface; and
- (c) a porous polymer monolith, comprised of a second polyvinyl monomer, in said channel, and attached to said first polymer in the selected regions, wherein the first and second monomers may be the same or different.

Claim 21(original): The device of claim 20 further comprising:

- (d) a polymer chain having a functional group attached to a portion of the porous polymer monolith by photoinitiated grafting of a third monomer, wherein the first and second monomers may be the same or different and the third monomer is different from the second monomer.

Claim 22(original): The device of claim 21 wherein the third monomer is an acrylate.

Claims 23-46 (cancelled).